



Vocal fatigue in teachers and non-teachers in a Turkish population

Necati Enver¹ , Akın Şahin² , Aylin Torğul¹ , Mehmet Sürmeli³ , Çağatay Oysu¹ 

¹Department of Otorhinolaryngology, Marmara University, Pendik Training and Research Hospital, Istanbul, Turkey

²Department of Otorhinolaryngology, Ardahan State Hospital, Ardahan, Turkey

³Department of Otorhinolaryngology, Health Sciences University, Ümraniye Training and Research Hospital, Istanbul, Turkey

ABSTRACT

Objectives: The aim of this study was to determine the voice use and associated vocal fatigue in teachers and to define their differences with other professional voice users and non-vocal non-professionals.

Patients and Methods: Between May 2020 and October 2020, a total of 187 participants (41 males, 146 females; mean age: 32.6±10.5 years; range, 23 to 65 years) were administered the Vocal Fatigue Index (VFI) questionnaire. Of the participants, 93 were teachers and 94 were non-teachers recruited from Istanbul province of Turkey. The relationship between the VFI and sociodemographic characteristics, professional activity, talkativeness, duration of active vocal use, and active vocal complaints were analyzed.

Results: The mean VFI score was 35.5±16.2. Those with a vocal complaint had significantly higher mean total VFI scores than those without any vocal complaints ($p<0.001$). Duration of voice use and total VFI scores were significantly higher in teachers than other professions ($p<0.001$ and $p<0.001$, respectively). The mean total VFI scores of teachers with or without vocal complaints did not significantly differ ($p=0.065$).

Conclusion: Our study results suggest that voice disorders are more common among teachers, compared to non-professional voice users. It is important to reveal the etiology of voice problems in teachers, particularly for early diagnosis and immediate treatment.

Keywords: Dysphonia, questionnaire, Vocal Fatigue Index, voice.

Teaching is a profession which requires high levels of communication and voice use. Teachers constitute one of the most important groups after elite voice performers in the classification of professional voice users, which is a widely used system based on the level of voice use.^[1] Many teachers require using their voice for long hours during their professional lives and, thus, they are among the groups most sensitive to

vocal problems.^[2-4] Vocal cord pathologies are reported to be higher in teachers than in normal population.^[2] Among these, vocal cord polyps, hemorrhage, and vocal cord nodules are more frequently observed.^[2,3] Also, teachers are more prone to experience vocal fatigue as a result of their profession.^[3,4]

Vocal fatigue can be defined as the decline in vocal performance due to a progressive

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Correspondence: Akın Şahin, MD. İnönü Mah., Sugöze Mevki, Toki Konutları, C4, D: 20, 75000 Ardahan, Türkiye.
e-mail: draknsahin@hotmail.com

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increase in phonatory effort.^[5] Most common signs and symptoms of vocal fatigue include tiredness after voice overuse, misuse or vocal abuse; reduced vocal projection, increased effort in voicing, strained voice quality, laryngeal discomfort, throat dryness and pain, and loss of voice. These complaints almost always exacerbate with voice use and alleviate with rest. Frequently experiencing these symptoms, particularly in professional voice users, can cause problems in professional and social life, as well as its financial and emotional impact.^[6-10]

The Vocal Fatigue Index (VFI) is a patient-based scale developed by Nanjundeswaran et al.,^[11] in 2015 to evaluate vocal fatigue. Its validity and reliability studies have been conducted in the Turkish population by Şirin et al.^[12] in 2019. Although teachers are expected to have higher vocal complaints, there is no study in the Turkish population investigating the vocal fatigue and associated problems in teachers. In the present study, we aimed to determine the voice use and associated vocal fatigue in teachers and to define their differences with other professional voice users and non-vocal non-professionals.

PATIENTS AND METHODS

This prospective study was conducted at Marmara University, Pendik Training and Research Hospital, Department of Otorhinolaryngology between May 2020 and October 2020. Patients who present with voice hoarseness and were diagnosed with a functional voice disorder referred to our clinic, regardless of their profession, were included in this study. Also, teachers who were working in various schools in Istanbul province in different levels of education (pre-school, primary school, high school) were invited via an online announcement and were included, independent of their voice disorder history. Patients older than 18 years who presented to our ear, nose and throat (ENT) clinic with non-voice related complaints were included as healthy controls. Those with a previous vocal surgery were excluded. Finally, a total of 187 participants (41 males, 146 females; mean age: 32.6±10.5 years; range, 23 to 65 years) were included.

A written informed consent was obtained from each participant. The study protocol was approved by the Marmara University, School of Medicine Ethics Committee. The study was conducted in accordance with the principles of the Declaration of Helsinki.

All patients included in the study were questioned about their vocal complaints. The presence of signs and symptoms of voice-related problems were objectively demonstrated in participants who described vocal complaints. Sociodemographic characteristics and work conditions of all participants were recorded. Characteristics of voice use and vocal signs and symptoms were evaluated. In terms of sociodemographic characteristics and work conditions, age, sex, type of school worked (pre-school, primary school, high school), years of experience in teaching, daily hours of teaching, characteristics of voice use outside of work, presenting to an ENT clinic for vocal problems and/or history of speech or voice therapy were questioned and documented. Level of talkativeness was self-assessed by patients by scoring from 1 to 10.

The Turkish version of VFI was applied to all participants.^[12] The VFI consists of 19 questions categorized into three factors. The first category (questions 1 to 11) evaluates vocal fatigue and avoidance, the second category (questions 12 to 16) evaluates physical discomfort associated with voicing, and the third category (questions 17 to 19) evaluates improvement of symptoms with rest. High scores in the first two categories indicate the severity of symptoms and vocal problems, while high scores in the third category represent improvement in symptoms, i.e., less problems. Each item is scored from 0 to 4, where 0= never, 1= almost never, 2= sometimes, 3= almost always, and 4= always. The total score is calculated by the simple sum of answers and the total score may vary from 0 to 76. The first category assessing vocal fatigue is scored from 0 to 44, the second category from 0 to 20, and the third category from 0 to 12.

Statistical analysis

Statistical analysis was performed using the IBM SPSS version 20.0 software (IBM Corp.,

Table 1. Sociodemographic characteristics of participants

	n	%	Mean±SD
Age (year)			32.6±10.5
Sex			
Male	41	21.9	
Female	146	78.1	
Profession			
Teacher	93	49.7	
Healthcare worker	30	16	
Student	25	13.4	
Housewife	18	9.6	
Secretary	12	6.4	
Social worker	9	4.8	
Professional voice use			
Yes	124	66.3	
No	63	33.7	
Active vocal complaint			
Yes	25	13.3	
No	162	86.7	
Duration of active voice use			22.3±14.0
Level of talkativeness			7.2±1.7
Total VFI score			35.5±16.2

SD: Standard deviation; VFI: Vocal Fatigue Index.

Armonk, NY, USA). Descriptive data were presented in mean ± standard deviation (SD) or median (min-max) for continuous variables and in number and percentage for categorical

variables. Categorical variables were compared using the chi-square and Fisher's exact tests. The Kruskal-Wallis test was used to compare non-normally distributed nominal variables. A *p* value of <0.05 was considered statistically significant.

RESULTS

Ninety-three participants were teachers active in their profession and 25 participants were students in active education. Eighteen participants were unemployed, while the remaining 61 participants were of various professions. The mean VFI score was 35.5±16.2. The mean level of talkativeness was 7.2±1.7 (Table 1).

There was no statistically significant difference between males and females in terms of mean VFI score (*p*=0.628). Those with a vocal complaint had significantly higher mean total VFI scores than patients without any vocal complaints (*p*<0.001). Also, professional voice users had significantly higher mean total VFI scores (*p*=0.049) (Table 2).

Duration of voice use and total VFI scores were significantly higher in teachers than other professions (*p*<0.001 and *p*<0.001, respectively). On the other hand, level of talkativeness did not exhibit a statistically significant difference among professions (*p*=0.116). The mean total VFI scores of teachers with or without vocal complaints also showed a significant difference (*p*=0.001) (Table 3).

Table 2. Association of total VFI score with clinical characteristics

	n	Total VFI score		<i>p</i>
		Mean±SD	SE	
Sex				0.628
Male	4	34.4±15.2	2.382	
Female	46	35.8±16.6	1.370	
Vocal complaints				<0.001
Yes	62	33.6±16.1	1.261	
No	5	48.0±11.4	2.277	
Professional voice use				0.049
Yes	3	32.2±15.5	1.957	
No	24	37.1±16.4	1.474	

VFI: Vocal Fatigue Index; SE: Standard error; SD: Standard deviation.

Table 3. Association of profession with clinical characteristics

	Teachers		Other professions		<i>p</i>
	Mean±SD	SE	Mean±SD	SE	
Duration of voice use	35.3±5.6	0.576	9.5±4.8	0.497	<0.001
Level of talkativeness	7.4±1.9	0.196	7±1.5	0.159	0.116
Total VFI score	41.72±15.005	1.556	94±29.3	15.090	<0.001

SD: Standard deviation; SE: Standard error; VFI: Vocal Fatigue Index.

DISCUSSION

In this study, we assessed voice fatigue in teachers with or without vocal complaints compared to the other population groups, and we found that VFI scores of teachers were higher in all three subcategories than non-teachers. Our study is the first to assess this issue in the Turkish population. According to the results, the mean VFI score in teachers of Turkish population is close to that of with the literature, and is higher than healthy non-teacher individuals of those populations.^[10,13,14] Evaluations using VFI also demonstrated three times or higher scores in teachers.^[15]

Hoarseness in teachers causes social, professional, and financial problems.^[16-20] Teachers experience vocal problems two to three times more than non-teachers and rate of absenteeism due to vocal problems reaches 17 to 23%.^[17,21] Also, it has been shown that 20% of teachers consider career changes due to vocal complaints.^[4,17]

There are many factors associated with vocal fatigue in teachers. These factors include number of teaching hours, years in the profession, classroom capacity, type of courses and female sex.^[15,19,22-24] Although there was no direct link between voice use and VFI score, which is inconsistent with the literature, this was considered to our limited sample size.^[25] Also, inconsistent with the literature, there was no significant difference between male and female teachers in the current study.

Vocal fatigue appears, as phonatory effort increases and causes physical discomfort after a period of voice use. The triggering factor is believed to be associated with increased oxygen need in phonatory muscles. In the

literature, various mechanisms are proposed to explain this, all of which are based on exercise physiology.^[26] It may be due to peripheral factors, such as decreased local blood flow or alteration in neuromuscular junction, as well as changes in the cerebral cortex. The number of studies investigating these hypotheses is limited. The results obtained in the study of Nanjundeswaran et al.^[26] indicated possible neuromuscular insufficiency and increased oxygen consumption.

Although our study is unique, as it is the first to assess Turkish teachers using VFI, it also has several methodological limitations. As it is an online questionnaire study, individuals with higher awareness of their vocal problems are more likely to participate, indicating that our study may have limited power in reflecting the actual distribution of vocal problems. However, considering the VFI scores in similar studies in the literature, it still may be noteworthy. Another limitation is the lack of data about the subjects that the teachers teach, quality of their schools, and tobacco use. It is well known that different types of school and class sizes contribute to vocal fatigue-related complaints. Further studies with a larger teacher sample of higher statistical power size and a matched healthy control group are warranted to obtain more accurate data about vocal fatigue in the Turkish teacher population.

In conclusion, our study results suggest that voice disorders are more common among teachers, compared to non-professional voice users. Several physical risk factors contribute to the development and exacerbation of voice disorders among teachers. Nonetheless, further studies are needed to confirm whether teachers

are at a higher risk of vocal disorders to clarify which voice-related problems result from specific teaching activities.

Declaration of conflicting interests

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